

Product catalog

DAR™ breathing filters



Table of contents

Filtration and cross contamination	3
Pleated mechanical filters	4
Electrostatic filters	4
Testing and quality	4
Specifically designed for mechanical and electrostatic filters	4
Mechanical filters	6
Mechanical filter range configurations	7
Electrostatic filters	8
Electrostatic filter range configurations	9
Spirometry filter and monitoring line filters	10
Electrostatic spirometry filter for lung function testing	10
Electrostatic spirometry filter and accessories	11
Monitoring line filter	11
Humidification – The need for the heat and moisture	12
DAR™ HMEs and filter HMEs	12
Filters with HME	13
Filters HME range configurations	13
Electrostatic Filter HMEs	14
Electrostatic filter HMEs range configuration	15
HME-only products for excellent airway humidification	16
HME-only configurations	17
Catheter mounths	18
DAR™ filter testing and efficiency	19
Index and references	26

Filtration and cross contamination

Filtration is key to reducing cross infections and protecting the patient's airway during ventilation in anesthesia and intensive care.

Unlike normal breathing, mechanical ventilation bypasses the upper airways – meaning inspired gases aren't filtered before reaching the lungs.

When anesthetic circuits are used for multiple patients, exhaled droplets or sputum should be prevented from entering the breathing system.

Therefore, it's recommended that you place breathing filters at the y-piece of the anesthesia circuit or at the distal expiratory limb of the ventilator circuit.^{1,3} This creates a barrier against bacteria, viruses, and patient secretions – preventing cross contamination among patients, medical staff, and equipment. Breathing filters should also be used to prevent contamination of hot water bath humidification systems.²

DAR™ breathing filters feature a mechanical (also called pleated hydrophobic) or an electrostatic filtering membrane. Both filter media have been shown to provide effective protection against cross contamination.¹⁻³

Protocols for bacterial and viral filtration tests might differ and affect filtration efficiency results.

For a comparison of filters' efficiency, refer to NaCl efficiency data, as per ISO 23328-1.



Pleated mechanical filters

How do they work?

A glass microfiber membrane is sealed inside the external housing of mechanical filters. The physical specifications of this material make it an ideal filter medium.

Microfibers are arranged randomly in a dense weave so that pore size is generally small enough to effectively capture particles.

This small pore size means that an extended filtration surface is needed to lower inspiratory and expiratory resistance to flow and work of breathing. To minimize resistance, you should use a large filtration surface. The membrane is pleated to allow use of low-volume housing.

Advantages of hydrophobicity

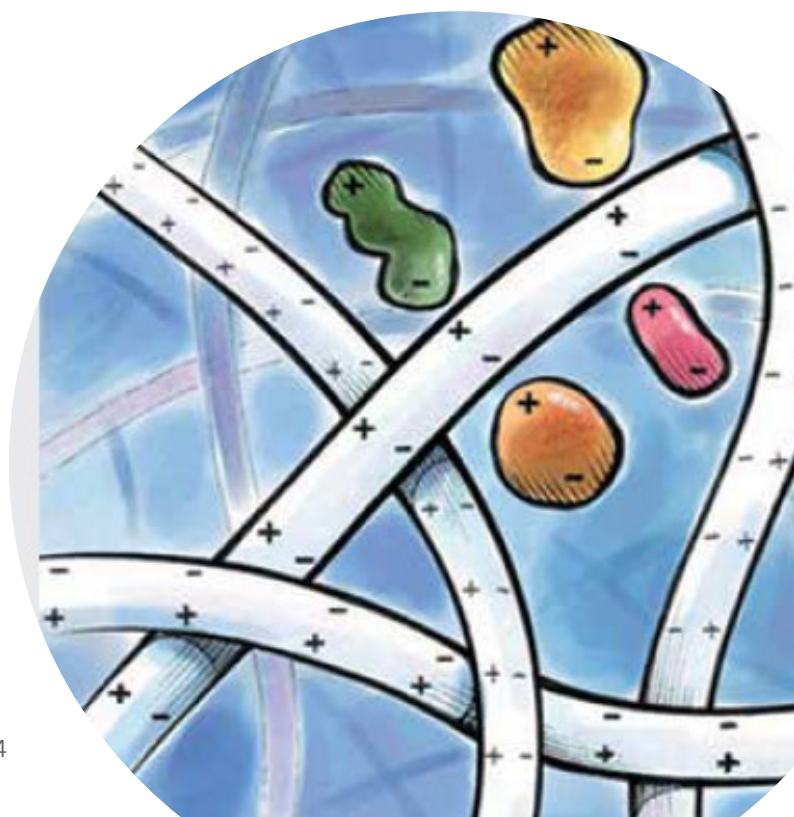
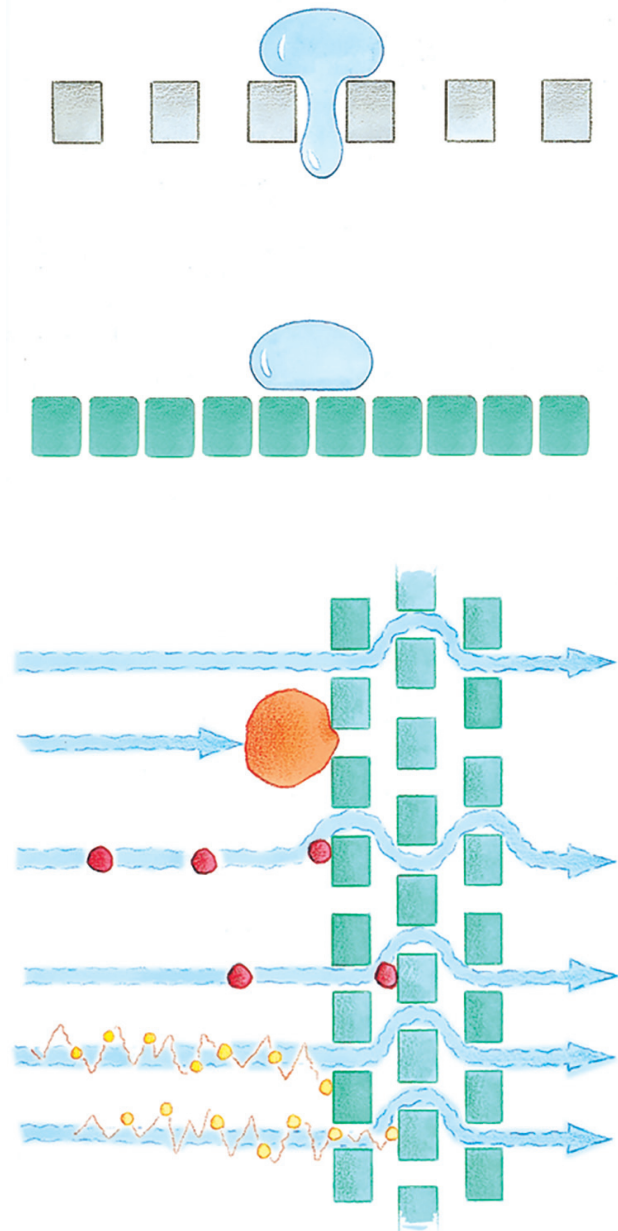
Airborne microbes and respiratory droplets are the leading causes of cross infection.¹ Thanks to their hydrophobic properties, DAR™ pleated mechanical filters are particularly effective in preventing the passage of these liquids. This means they will prevent patient secretions and other liquids from contaminating the system.

Several studies^{1,2,4,5} show that sputum and condensation may be forced through a breathing system filter if sufficient pressure is applied (e.g., a cough). That liquid penetration occurs at significantly lower pressures for electrostatic compared to mechanical pleated filters.

Electrostatic filters

Electrostatic filters offer a high level of microbial removal and low resistance to airflow. The filter membrane is made of a thin, hydrophobic, nonwoven polypropylene material which has a permanent electrical charge induced during the manufacturing process. The superficial electrostatic charge attracts bacteria and viruses to oppositely charged sites on the membrane, causing them to become trapped.

Although some electrostatic filters offer a high efficiency rating, their effectiveness may be reduced in humid environments.² Electrostatic filters perform best in low humidity, such as on the inspiration port of the ventilator or at the wye of an anesthesia breathing circuit. These components don't come into contact with patient secretions or moisture.



Testing and quality

To improve patient outcomes and ensure comfort and safety, extensive testing has been performed on DAR™ range of filters and filter HMEs (Heat and Moisture Exchangers).

All products are individually tested during the manufacturing stage to ensure their integrity. Each product has been tested at internationally recognized centers using aerosols of monodispersed bacteria and viruses – and sodium chloride challenge testing.

Relevant standards

All filters have been tested in compliance with the current revision of the following standards:

- EN ISO 23328-1 breathing system filters for anesthetic and respiratory use – part one: salt test method to assess filtration performance.
- EN ISO 23328-2 breathing system filters for anesthetic and respiratory use – part two: nonfiltration aspects
- EN ISO 9360-1 anesthetic and respiratory equipment heat and moisture exchangers (HMEs) for humidifying respired gases in humans – part one: HMEs for use with minimum tidal volumes of 250 mL
- EN ISO 9360-2 anesthetic and respiratory equipment: Heat and moisture exchangers (HMEs) for humidifying respired gases in humans – part two: HMEs for use with tracheostomized patients having minimum tidal volumes of 250 mL
- ISO 594-1 (§ 4.1) conical fittings with a six percent (Luer) taper for syringes, needles, and certain other medical equipment – part one: general requirements

All products are medical devices CE 0123 marked in accordance to Medical Device Regulations 2017/745 or similar. Each one is manufactured in a facility whose quality system complies with the international quality management and quality assurance standards ISO 13485 and Medical Device Regulations 2017/745 or similar.

These facilities are regularly inspected by TÜV product service, acting as MDR notified body #0123 and quality system certification body, and USA/FDA for compliance with US GMP.

Sterility

DAR™ filters, HMEs, and filter heat-moisture exchangers (FHMEs) are sterilized by ethylene oxide exposure. The entire cycle is validated according to ISO 11135 standard.



Mechanical filters

The mechanical filter range consists of a complete line of products for different applications in anesthesia and intensive care. The systematic use of breathing filters protects patients and staff from cross infection⁵ – and may reduce costs by preserving ventilation equipment and extending the life of breathing systems.

Mechanical filter, large – STERIVENT

The mechanical filter large is an excellent option for ventilator protection in both intensive care and anesthesia. For best results, this option should be used at the inspiratory and expiratory outlet of the ventilator. The mechanical filter, large has been tested against hepatitis C Virus,^{1,7} mycobacterium tuberculosis,^{1,8} and allergenic natural latex proteins.^{1,9}

Mechanical filter, compact – STERIVENT S

The lightweight mechanical filter compact can be used for patient or ventilator protection in both anesthesia and intensive care. It has been tested against hepatitis C virus^{1,10} and HIV-1.^{1,11}

Mechanical filter, small – STERIVENT MINI

Indicated for short-term anesthesia, the mechanical filter small is at the same time highly efficient and compact. Its reduced internal volume makes it a good choice for most pediatric and adult use with positioning at the y-piece. Mechanical filter small has been successfully validated against pathogenic microorganisms such as HCV,^{1,12} HIV-1^{1,13} and mycobacterium tuberculosis.^{1,14} It has also proved effective for filtration of allergenic natural latex proteins⁹ and prion proteins.^{1,15} The mechanical filter range has predominantly filtering properties. For mechanical ventilation, the selection of devices with adequate humidification performance is recommended. Clinical results indicate that devices that deliver gases with an AH >30 mg H₂O/l have low risk of endotracheal tube occlusions, even during prolonged use.^{1,16}

	Mechanical filter, large STERIVENT 351/5410	Mechanical filter, compact STERIVENT S 351/5878	Mechanical filter, small STERIVENT mini 351/5987
Tidal volume range	300 - 1500 mL	200 - 1500 mL	150 - 1200 mL
NaCl filtration efficiency^{1,17}	≥99.989%†	≥99.747%	≥99.71%†
Bacterial filtration efficiency	≥99.9999% ^{1,18}	≥99.9999% ^{1,19}	≥99.9999% ^{1,18}
Viral filtration efficiency¹	≥99.999% ^{1,20}	≥99.9999% ^{1,21}	≥99.997% ^{1,20}
Resistance to flow†	-	-	0.5 cm H ₂ O at 15 L/min
	0.8 cm H ₂ O at 30 L/min	0.8 cm H ₂ O at 30 L/min	1.2 cm H ₂ O at 30 L/min
	2 cm H ₂ O at 60 L/min	1.9 cm H ₂ O at 60 L/min	2.7 cm H ₂ O at 60 L/min
	3.6 cm H ₂ O at 90 L/min	3.2 cm H ₂ O at 90 L/min	4.5 cm H ₂ O at 90 L/min
Moisture loss†	13 mg H ₂ O/l at VT 500 mL	15 mg H ₂ O/l at V _T 500 mL	17 mg H ₂ O/l at V _T 500 mL
Moisture output²²	23 mg H ₂ O/l at VT 500 mL	21 mg H ₂ O/l at V _T 500 mL	16 mg H ₂ O/l at V _T 500 mL
Internal volume†	92 mL	66 mL	42 mL
Weight†	47 g	39 g	24 g

All products are latex free, individually packed, sterile, in boxes of 25.

† Internal testing. Mirandola (various 2006 - 2013).

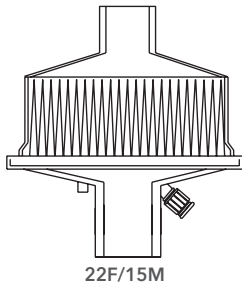
The above data are average values.

Mechanical filter range configurations

- Caps are secured to luer lock port connectors to prevent them from being misplaced during use.
- All products are latex free.
- Each filter is individually packed, sterile, in boxes of 25.

Mechanical filter
Large – STERIVENT

22M/15F

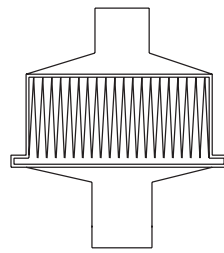


22F/15M

351/5410 also 351/5410TC
with tethered cap

Mechanical filter
Large – STERIVENT

22M

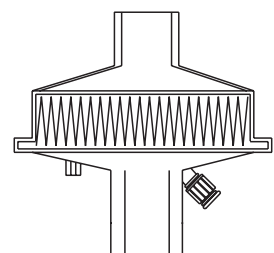


22F

351/5856
without CO₂ port

Mechanical filter
Compact – STERIVENT S

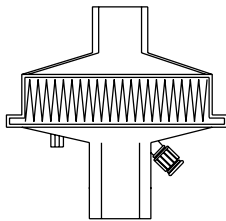
22M/15F



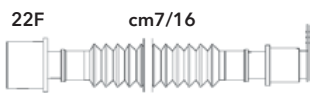
22F/15M

351/5878 also 351/5878TC
with tethered cap

22M/15F



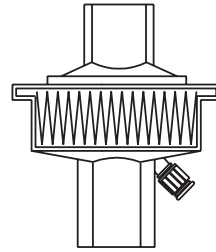
22F/15M



351/5848
with extendible catheter
mount

Mechanical filter
Small – STERIVENT mini

22M/15F

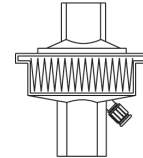


22F/15M

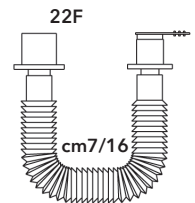
351/5979 also
351/5979TC
with tethered cap

Mechanical filter
Small – STERIVENT mini

22M/15F



22F/15M



351/5980
with extendible
catheter mount

Electrostatic filters

The electrostatic filter range is a simple, efficient, and cost-effective solution. Large, small, and pediatric/neonatal filters differ only in size, and their round shape makes handling easier. Their light weight minimizes pressure and torque on patient airway when placed at the y-piece. They are a good choice for short-term anesthesia when an HME is not required.

Electrostatic filter, large – BARRIERBAC

High filtration efficiency coupled with low resistance to flow make it acceptable in low-humidity anesthesia applications or on the inspiration port of a ventilator.

Electrostatic filter, small – BARRIERBAC S

Lightweight and compact in volume, it is suitable for use on both adult and pediatric patients as effective protection in short-term anesthesia.

Electrostatic filter, small, pediatric-neonatal – BARRIERBABY

Specifically designed for short-term anaesthesia, it is an effective solution for patients with a tidal volume between 30-100 mL, to reduce the risk of cross contamination.

Electrostatic filter, large BARRIERBAC 350/5422, 350/5865	Electrostatic filter, small BARRIERBAC S 350/5879, 350/5845	Electrostatic filter, small, pediatric-neonatal BARRIERBABY 350/19003
---	---	---



Tidal volume range	300 - 1500 mL	150 - 1200 mL	30 - 100 mL
NaCl filtration efficiency^{1,17}	≥99.592%†	≥98.096%	≥94.409%†
Bacterial filtration efficiency	≥99.9999% ^{1,18}	≥99.9999% ^{1,19}	≥99.999% ^{1,25}
Viral filtration efficiency¹	≥99.9999% ^{1,20}	≥99.999% ^{1,20}	≥99.99% ^{1,27}
Resistance to flow†	-	-	0.3 cm H ₂ O at 2.5 L/min
	-	-	0.6 cm H ₂ O at 5 L/min
	0.6 cm H ₂ O at 60 L/min	0.8 cm H ₂ O at 30 L/min	0.9 cm H ₂ O at 7.5 L/min
	1.5 cm H ₂ O at 60 L/min	2.1 cm H ₂ O at 60 L/min	1.3 cm H ₂ O at 10 L/min
	2.6 cm H ₂ O at 90 L/min	3.7 cm H ₂ O at 90 L/min	2.0 cm H ₂ O at 15 L/min
Moisture loss†	17 mg H ₂ O/l at V _T 500 mL	18 mg H ₂ O/l at V _T 500 mL	
Moisture output²²	16 mg H ₂ O/l at V _T 500 mL	9 mg H ₂ O/l at V _T 500 mL	
Internal volume†	99 mL	36 mL	11 mL
Weight†	35 g	19 g	8 g

All products are latex free, individually packed, sterile, in boxes of 25.

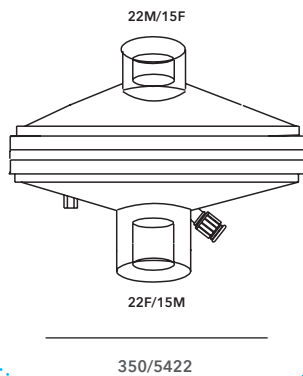
† Internal testing, Mirandola (various 2006-2013).

The above data are average values.

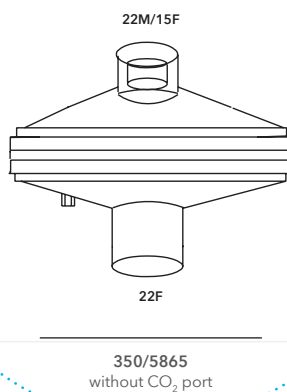
BARRIERBAC™ electrostatic filter range configurations

- All products are latex free.
- Products are individually packed, sterile, in boxes of 25.

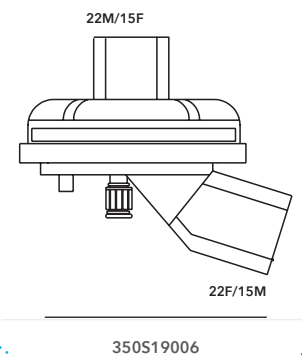
**Electrostatic filter
Large – BARRIERBAC**



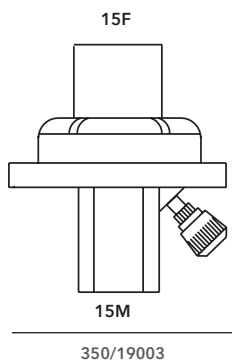
**Electrostatic filter
Large – BARRIERBAC**



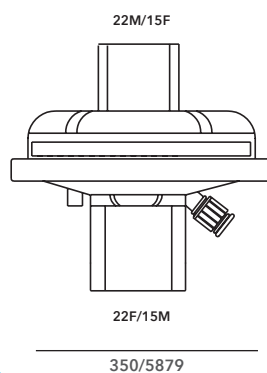
**Electrostatic filter
Small, angled port –
BARRIERBAC S-A**



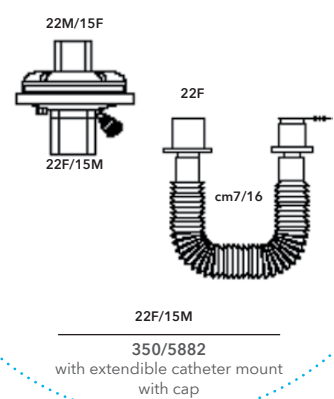
**Electrostatic filter
Small, Pediatric –
NEONATAL BARRIERBABY**



**Electrostatic filter
Small – BARRIERBAC S**



**Electrostatic filter
Small**



Spirometry filter and monitoring line filters

The spirobac electrostatic spirometry filter was developed to protect both patients and equipment during lung function testing.

This filter may reduce the risk of cross contamination by providing protection against microorganisms exhaled by patients during testing.^{1,28}

In compliance with the guidelines released jointly by the European Respiratory Society and the American Thoracic Society,^{1,29} electrostatic spirometry filter resistance is lower than the maximum limit of 1.5 cm H₂O /L/sec in a flow range of 0-14 L/sec. It does not impair test results.

Its anatomical oval shape helps ensure maximum patient comfort and subsequent reliable test results.

A series of accessories make the electrostatic spirometry filter compatible with a range of testing equipment and suitable for different spirometry techniques.

Electrostatic spirometry filter for lung function testing

REF	500P30022
Type of filtration	Electrostatic
Bacterial filtration efficiency ^{1,30}	≥99.9%
Viral filtration efficiency ^{1,31}	≥99.2%
Resistance to flow [†]	0.1 cm H ₂ O at 1 l/min
	0.3 cm H ₂ O at 2 l/min
	0.6 cm H ₂ O at 3 l/min
	1.4 cm H ₂ O at 5 l/min
	4.4 cm H ₂ O at 10 l/min
	9.2 cm H ₂ O at 15 l/min
Internal volume [†]	56 mL
Weight [†]	14 g

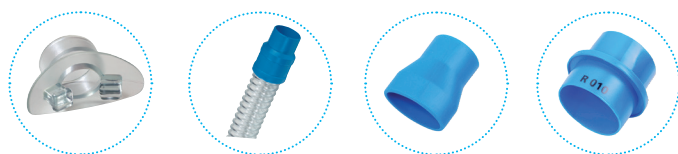
All products are latex free, individually packed, sterile, in boxes of 25.

[†] Internal testing, Mirandola (2005)

The above data are average values.



Electrostatic spirometry filter accessories



REF		Packaging
-----	--	-----------

500P30021	Electrostatic spirometry filter mouthpiece, oval shaped	25 ea/case
-----------	---	------------

Adapters for lung function testing equipment

	Electrostatic spirometry filter connection	Device connection	
R001	33F	22F	10 ea/case
R002	33F	25F	10 ea/case
R004	33F	27F	10 ea/case
R005	33F	27.5F	10 ea/case
R007	33F	28.5F	10 ea/case
R010	33F	30F	10 ea/case
R012	33F	31F	10 ea/case
R013	33F	32F	10 ea/case
R015	33F	34F	10 ea/case
R022	33F	27M	10 ea/case
R023	33F	28M	10 ea/case
R024	33F	29.5M	10 ea/case

All products are latex free.

Electrostatic spirometry filter and its accessories are supplied clean.

Monitoring line filter

The monitoring line filter has been designed to reduce the risk of cross contamination of patients and equipment. It functions as an antimicrobial bi-directional filter for use on gas lines such as:

- Pressure monitoring lines
- Sensors/flow transducer connecting lines
- Sampling lines for gas analysers (oxygen and halogenate gases)
- Nebuliser drive lines
- All products are latex free.

Monitoring Line Filter
350S5807



Type of filtration	Electrostatic
Bacterial filtration efficiency ^{1,25}	≥99.999%
Viral filtration efficiency ^{1,27}	≥99.99%
Resistance to flow [†]	2 mm H ₂ O at 1 L/min
	4 mm H ₂ O at 2 L/min
	7 mm H ₂ O at 3 L/min
	14 mm H ₂ O at 5 L/min
	45 mm H ₂ O at 10 L/min
	92 mm H ₂ O at 15 L/min
Internal volume [†]	7.5 mL
Weight [†]	10 g
Connections [†]	7 mm O.D.

This product is latex free, individually packed, sterile, in boxes of 25.

[†] Internal testing, Mirandola (2009)

The above data are average values.

REF		Packaging
-----	--	-----------

350S5807	Monitoring line filter - single packed, sterile	25 ea/case
----------	---	------------

Additional monitoring line filter sets available

Humidification – the need for heat and moisture

Intubation bypasses the upper airway, preventing it from heating and humidifying inspired air.

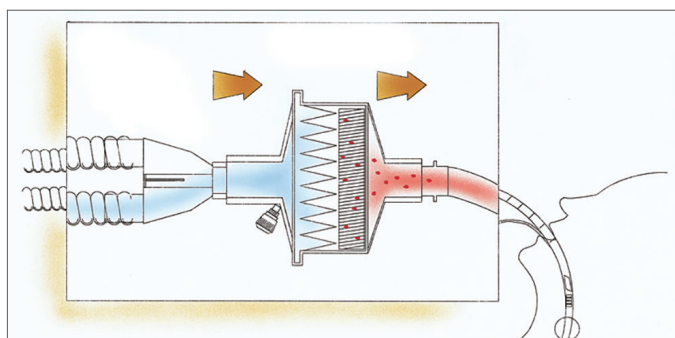
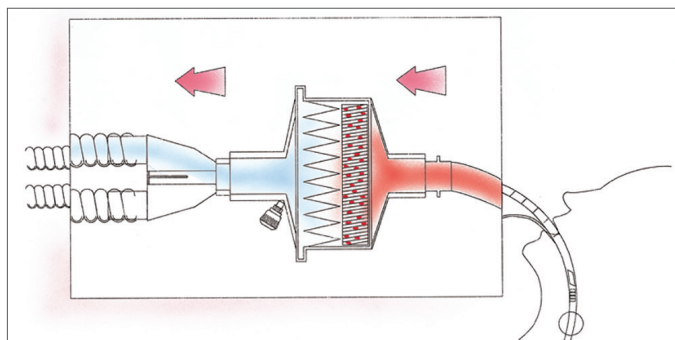
Heat and moisture exchangers (HMEs) simulate the natural humidification of the upper airway by capturing the patient's own heat and moisture from expired air. As the patient breathes in, the heat and moisture in the HME warms and humidifies the air.

When combined with a mechanical or electrostatic filtering medium, HMEs help protect patients and equipment from microbial contamination, providing a valid option to avoid the costs of frequent decontamination of the anesthesia breathing system.^{1-3, 6}

Heat and moisture exchanger functioning

During exhalation the heat and moisture in the patient's breath are trapped by the cellulose HME element.

On the subsequent inspiration, the trapped heat and moisture are released to the patient.



DAR™ HMEs and filter HMEs

DAR™ filter HMEs were the first high-performance filter HME (FHME) that coupled a moisture output element with an electrostatic filter membrane.

From this first and innovative product, we have developed a series of state-of-the-art products in the field of heat and moisture exchange technology. An important aspect of the DAR™ product line is the diversification of the HME and FHME models to suit the end-user requirements.

All products have been tailored to meet the specific needs of anesthesia, intensive care, and home care.

Mechanical filter HME

DAR™ filter HMEs are available with pleated mechanical or electrostatic filtration materials so you can choose the product which best suits your clinical needs.

Mechanical filter HME, large – HYGROSTER

Ideal for use in the ICU, it combines effective humidification with the high levels of hydrophobicity and filtration which only the pleated mechanical filter material can provide. The Hygroster filter HME has been tested against hepatitis C virus,^{1,36} HIV-1,^{1,37} and mycobacterium tuberculosis.^{1,38}

Mechanical filter HME, large – HYGROSTER
354/5876



Type of filtration	Mechanical
Tidal volume range	300 - 1500 mL
NaCl filtration efficiency	99.794% †,1,17
Bacterial filtration efficiency	≥99.9999% ^{1,41}
Viral filtration efficiency	≥99.9999% ^{1,43}
Resistance to flow†	
	1.1 cm H ₂ O at 30 L/min
	2.5 cm H ₂ O at 60 L/min†
	4.2 cm H ₂ O at 90 L/min
Moisture loss	5 mg H ₂ O/l at V _T 500 mL ^{1,57}
Moisture output	34 mg H ₂ O/l at V _T 500 mL ^{1,22}
Internal volume†	96 mL
Weight†	49 g

All products are latex free, individually packed, sterile, in boxes of 25.

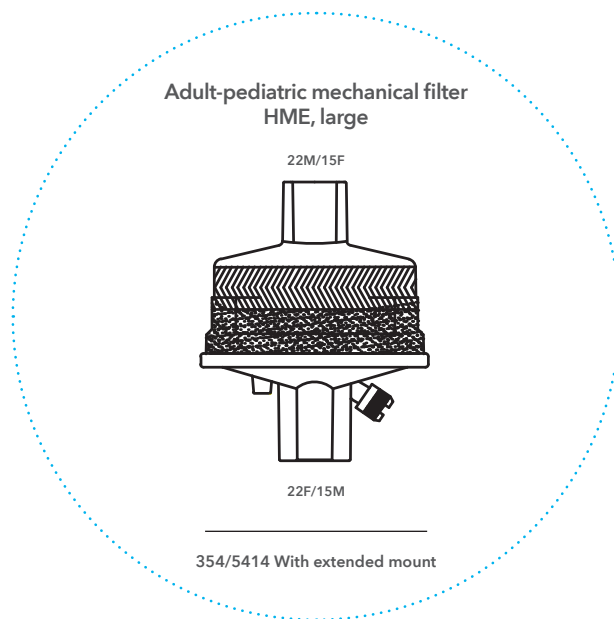
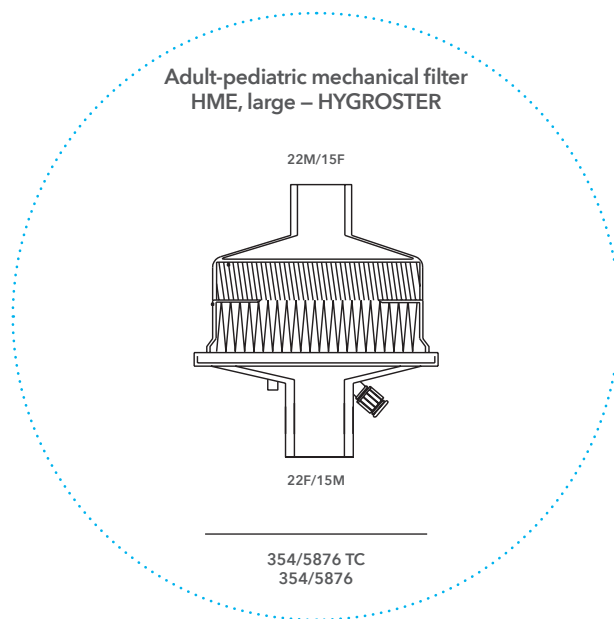
† Internal testing. Mirandola (various 2006 - 2013).

The above data are average values.

Filter HMEs range configurations

Mechanical filter HMEs

- All products are latex free.
- Products are individually packed, sterile, in boxes of 25.



Electrostatic filter HMES

Electrostatic filter HME, large – HYGROBAC

Effective electrostatic filtration, high-moisture output and low-resistance to air flow make the filter suitable for most ventilation techniques on adult patients. The adult-pediatric electrostatic filter HME, large has been tested against hepatitis C virus.^{1,46}

Electrostatic filter HME, small – HYGROBAC S

Designed for use in intensive care and routine anaesthesia, adult-pediatric electrostatic filter HME, small is today the filter/HME of choice for all applications, both on adult and pediatric patients, due to its compact size with no compromise on filtration efficiency and moisture output.

It is also available in an angled version called adult-pediatric electrostatic filter HME small, angled port. The adult-pediatric electrostatic filter HME small has been tested against hepatitis C virus,^{1,47} HIV-1^{1,48} and mycobacterium tuberculosis.^{1,49}

Electrostatic filter-HME PEDIATRIC – HYGROBOY, Electrostatic filter-HME INFANT – HYGROBABY

Optimal size for pediatric and infant patients, these filters are a simple and effective solution on patients undergoing short term intubation.

	Adult-pediatric electrostatic filter HME, large HYGROBAC 352/5805	Adult-pediatric electrostatic filter HME, small HYGROBAC S 352/5877, 352/5893 352/5830, 352/5981	Adult-pediatric electrostatic filter HME, small, angled port HYGROBAC S-A 352/5996	Infant-pediatric electrostatic filter HME, small HYGROBOY 355/5430	Pediatric-neonatal electrostatic filter HME, small HYGROBABY 355/5427
					
Type of filtration	Electrostatic	Electrostatic	Electrostatic	Electrostatic	Electrostatic
Tidal volume range	300 - 1500 mL	150 - 1200 mL	150 - 1200 mL	75 - 300 mL	30 - 100 mL
NaCl filtration efficiency	≥99,623%†	≥98,352% ^{1,1,58}	≥98,352% ^{1,58}	≥96,263% ^{1,17}	≥94,186% ^{1,17}
Bacterial filtration efficiency¹	≥99,9999% ^{1,50}	≥99,9998% ^{1,18}	≥99,9998% ^{1,18}	≥99,999% ^{1,51}	≥99,999% ^{1,52}
Viral filtration efficiency	≥99,998% ^{1,53}	> 99,999% ^{1,20}	>99,999% ^{1,20}	≥99,99% ^{1,54}	≥99,99% ^{1,55}
Resistance to flow†					0.3 cm H ₂ O at 2.5 L/min
	1 cm H ₂ O at 30 L/min	1.2 cm H ₂ O at 30 L/min	1.2 cm H ₂ O at 30 L/min	1.4 cm H ₂ O at 15 L/min	0.6 cm H ₂ O at 5 L/min
	2.1 cm H ₂ O at 60 L/min	2.7 cm H ₂ O at 60 L/min	2.9 cm H ₂ O at 60 L/min	3 cm H ₂ O at 30 L/min	1 cm H ₂ O at 7.5 L/min
	3.7 cm H ₂ O at 90 L/min	4.8 cm H ₂ O at 90 L/min	5.2 cm H ₂ O at 90 L/min	4.7 cm H ₂ O at 45 L/min	1.5 cm H ₂ O at 10 L/min
Moisture loss					2.5 cm H ₂ O at 15 L/min
	6 mg H ₂ O/l at V _T 500 mL†	6 mg H ₂ O/l at V _T 500 mL ^{1,56}	6 mg H ₂ O/l at V _T 500 mL†	6 mg H ₂ O/l at V _T 75 mL†	Not applicable
				8 mg H ₂ O/l at V _T 250 mL†	Not applicable
Moisture output²²	33 mg H ₂ O/l at V _T 500 mL	33 mg H ₂ O/l at V _T 500 mL	33 mg H ₂ O/l at V _T 500 mL	31 mg H ₂ O/l at V _T 250 mL	28 mg H ₂ O/l at V _v 50 mL
Internal volume†	93 mL	51 mL	61 mL	29 mL	10 mL
Weight†	48 g	28 g	29 g	21 g	9 g

All products are latex free, individually packed, sterile, in boxes of 25.

† Internal testing, Mirandola (various 2000-2013).

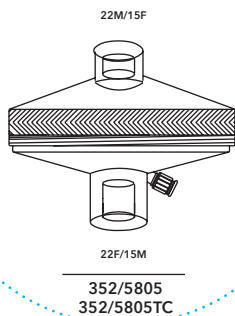
The above data are average values.

Filter HMEs range configurations

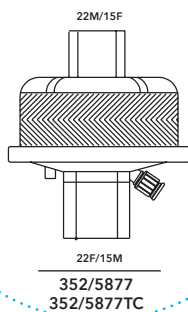
Electrostatic filter HMEs

- All products are latex free.
- Products are individually packed, sterile, in boxes of 25.

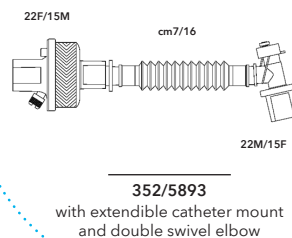
Adult-pediatric
electrostatic filter HME,
large - HYGROBAC



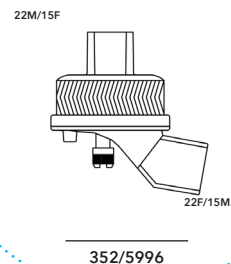
Adult-pediatric
electrostatic filter HME,
small - HYGROBAC S



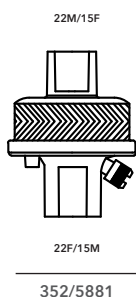
Adult-pediatric
electrostatic filter HME,
small - HYGROBAC S



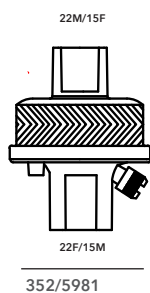
Adult-pediatric
electrostatic filter HME,
small, angled port -
HYGROBAC S-A



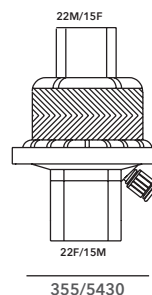
Electrostatic filter W MTX25
HYGROBAC S



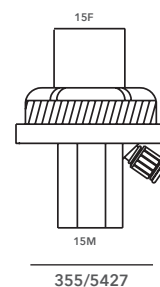
HYGROBAC S electrostatic
filter HME W EXT MT



Electrostatic filter HME
pediatric - HYGROBOY



Electrostatic filter HME
infant - HYGROBABY



HME-only products for excellent airway humidification

A range of easy-to-use HMEs for when filtration is not required.

HME for tracheostomized patients

Designed for spontaneously breathing tracheostomy patients. An integral oxygen port heats and humidifies supplemental oxygen.

Adult-pediatric HME, small

Compact size and high HME performance make it ideal for use on adult and pediatric patients in anaesthesia, ICU, and home care.

Adult-pediatric foam HME with integrated catheter mount

Light weight and cost effective open-cell foam HME for anaesthesia and ICU, it incorporates an extendible flexible catheter mount with variable internal volume.



HME for tracheostomized patients – TRACHEOLIFE II 353S19004

Adult-pediatric HME, small – HYGROLIFE II 353S19007

Adult-pediatric foam HME with integrated catheter mount – FLEXLIFE 353P5908

HME for tracheostomized patients – TRACHEOLIFE III 353S19046



Tidal volume range	>15 kg body weight	100 - 1000 mL	200 - 1000 mL	>15kg body weight
Resistance to flow	0.8 cm H ₂ O at 30 L/min	0.9 cm H ₂ O at 30 L/min	0.4 cm H ₂ O at 30 L/min	0.6cm H ₂ O at 30L/min
	1.8 cm H ₂ O at 60 L/min	2.2 cm H ₂ O at 60 L/min	1.2 cm H ₂ O at 60 L/min	1.1cm H ₂ O at 60 L/min
	3.2 cm H ₂ O at 90 L/min	4 cm H ₂ O at 90 L/min	2 cm H ₂ O at 90 L/min	1.7cm H ₂ O at 90L/min
Moisture loss	11 mg H ₂ O/l at V _T 500 mL	7 mg H ₂ O/l at V _T 500 mL	6 mg H ₂ O/l at V _T 500 mL	11 mgH ₂ O/l at V _T 500 mL
Moisture output	28.5 mg H ₂ O/l at V _T 500 mL	30 mg H ₂ O/l at V _T 500 mL	31.5 mg H ₂ O/l at V _T 500 mL	33 mgH ₂ O/l at V _T 500 mL
Internal volume	16 mL	29 mL	60 mL compressed/ 75 mL extended	13 mL
Weight	8.5 g	22 g	12 g	8g

All products are latex free, individually packed, sterile, in boxes of 25.

Internal testing, Mirandola (various 2000-2008).

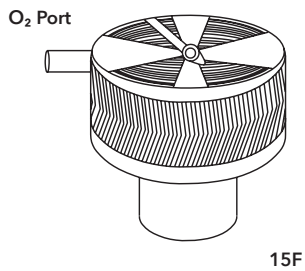
The above data are average values.

HME-only configurations

Electrostatic filter HMEs

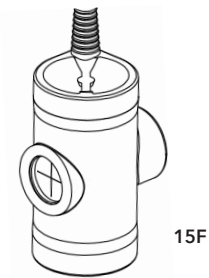
- All products are latex free.
- Products are individually packed, sterile, in boxes of 25.

HME for tracheostomized patients – TRACHEOLIFE II



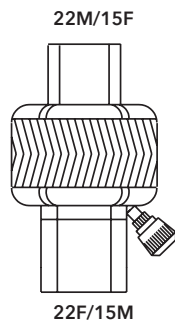
353/19004

HME for tracheostomized patients – TRACHEOLIFE III



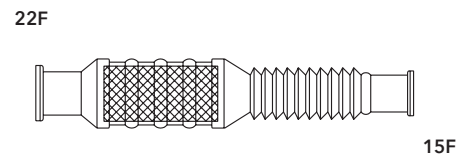
353S19046

Adult-pediatric HME, small – HYGROLIFE II



353S19007

Adult-pediatric foam HME with integrated catheter mount – FLEXLIFE



353P5908

Catheter mounts



Catheter mounts

Catheter mounts are used to connect a breathing system to an endotracheal or a tracheostomy tube and help provide optimal gas delivery, administer drugs if needed, and perform endotracheal suctioning. They allow adjustments to the breathing systems while keeping the endotracheal tube in place. Our catheter mounts include a wide choice of smoothbore PVC, PP, and PE configurations.

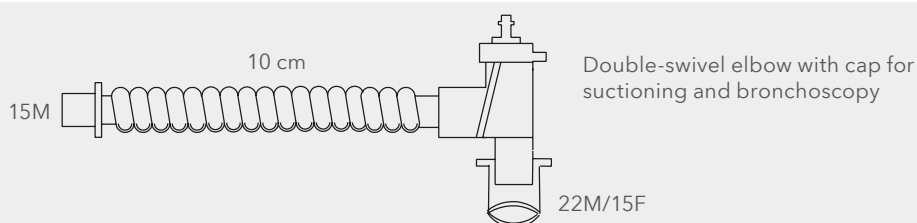
Main features

- Lightweight, atoxic, transparent catheter mounts with compliance less than 2%
- Spiral armouring avoids occlusion under torsion or flexion
- Low dead space
- Smoothbore internal surface prevents fluid buildup reducing risks of bacterial growth
- PP expandable material allows the operator to set and fix the catheter mount in several positions and saves storage space
- Bonded connectors
- 15M or 22F adapters available
- Individually packed, sterile, in boxes of 25

PVC catheter mounts

PVC catheter mounts with double swivel elbow connector

331/5389



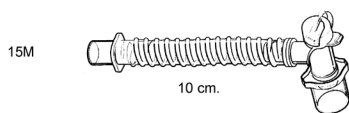
Code	Description	Sterile	Notes
331/5389	10 cm long, 15M adapter – 22M/15F patient connections	✓	
Also available			
331/5390	15 cm long, 15M adapter	✓	
331/5391	10 cm long, 22F adapter	✓	
331/5373	20 cm long, 15M adapter	✓	
331/5385	15 cm long, 22F adapter	✓	
331/5395	20 cm long, 22F adapter	✓	
331/5626	5 cm long, 15M adapter	✓	
Box quantity: 25			

Catheter mounts

All products are latex free, individually packed, sterile, in boxes of 25.

Sixty-degree angled elbow catheter mounts with cap

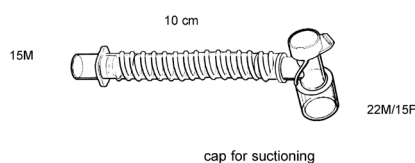
Catheter mount with Double Swivel Elbow, 10 cm 22M/15F patient connection and 15M ventilator side, rubber cap for suctioning port with self-sealing port for Bronchoscopy, sterile



331/5391

Sixty-degree angled elbow catheter mount

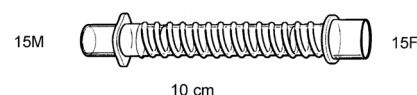
Catheter mount with 60° angled elbow 22M/15F connections. Rubber cap for suctioning port.



331/5112

Straight connector catheter mounts

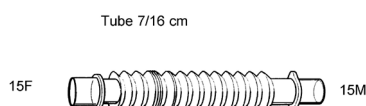
Catheter mount with straight connector; 10 cm, 15M-15F connections, sterile, 22F or 15M adapters.



332/5309
10 cm, 22F-15F connections, dead space
25 mL, sterile
332/5115
15 cm, 51F-15F connections, dead space
35 mL, sterile

Straight connector catheter mounts

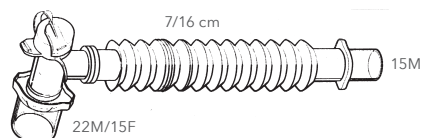
Catheter mount with straight connector; 7/16 cm, 22M-15F connections. 22F or 15F-15M connection.



332/5663

Double swivel elbow catheter mounts

Catheter mount with double swivel elbow, 7/16 cm, 22</15F patient connection, 15M ventilator side connection, rubber cap with suctioning and bronchoscopy port, sterile.



331/5661
Extendible PP Catheter Mounts

DAR™ filter testing and efficiency

To date, there are no international standards for microbiological filtration tests that can be used to evaluate the retention efficiency of respiratory filters with various microorganisms. Traditionally, the filtration efficiency is based on nonstandardized microbiological methods.

All DAR™ filters and filters with HME are tested in accordance with the most current revisions of the applicable standards.

In order to guarantee safety and improve the outcomes of patients and hospital staff, the DAR™ filters and filters with HME have also been tested at internationally recognized centers to assess their efficiency against certain bacteria and viruses.

Below you will find a summary table that includes all pathogens and microorganisms in which, according to the model, the filtration efficiency of DAR™ HME filters and filters range has been tested with the relative characteristics.

Test Type	Challenge (Pathogens Tested)	Particle Size	Particle Size Aerosolized
NaCl	Sodium Chloride [†]	Not Known	0.26 µm
BFE	Staphylococcus aureus [†]	0.8–1 µm	3.0 ± 0.3 µm
BFE	Mycobacterium tuberculosis H37Rv	0.5 x 2–4 µm [‡]	Not known
BFE	Bacillus subtilis [†]	0.96–1.25 x 0.55–0.67 µm	Less 2.1 µm
BFE	Pseudomonas aeruginosa	0.5–0.7 µm x 1.5–3.0 µm [§]	Not known
BFE	Micrococcus luteus	0.8 µm [‡]	Not known
BFE	Serratia marcescens [†]	0.7 x 1.0 µm [‡]	0.6–7.0 µm
BFE	Staphylococcus Rosaceus [†]	0.7–1.2 µm	1.7 µm
VFE	MS-2 bacteriophage [†]	20 nm	1.7 µm
VFE	ΦX174 bacteriophage [†]	0.025–0.027 µm	3.0±0.3 µm
VFE	HIV-1 [§]	120 nm	Not known
VFE	Hepatitis C Virus [§]	30–38 nm	Not known
Prion	Prion protein [§]	200 x 20 nm	Not known
Latex proteins	Starch powder [§]	Not known	Not known

[†] Based on aerosolized BFE / VFE tests

[‡] It is not necessary to know the size of the aerosolized particles because the size of the “non-aerosolized” particle indicates that the pathogen in question is larger than that of sodium chloride.

[§] For this test type only the diameter is known, but it is not larger than the aerosolized NaCl particle. However, BFE and VFE tests that use an aerosolized suspension of bacteria / viruses are considered to be the most similar in vitro studies, compared to clinical scenarios (this is also formalized in the first draft of ISO-23328, which was made to standardize the aerosol tests BFE / VFE).

The most common tests (carried out with microorganisms) are the “bacterial filtration efficiency” tests (BFE Bacterial Filtration Efficiency) performed with Staphylococcus aureus or Mycobacterium tuberculosis H37Rv, and those of “viral filtration efficiency” (VFE - Viral Filtration Efficiency) performed with HIV-1, bacteriophage ΦX174 or Hepatitis C.

The BS EN 13328-1 standard published in 2001 describes a filtration efficiency test method based on NIOSH, a well established protocol used for respiratory airways protective devices. In this test, the membrane filtering capacity is tested with aerosolized sodium chloride particles in the range from 0.1 to 0.3 µm, which considered to be the particles with the most penetrating dimensions (MPPS - Most Penetrating Particle Size). The NOT MICROBIOLOGICAL test, based on the challenge of aerosolized sodium chloride particles, was ISO standardized in 2003 (ISO

23328-1: 2003) and is known as "NaCl Test". The size of the aerosolized sodium chloride particles generated according to the standard is considered the "worst case" condition to simulate the patient's microbiological clinical contamination; the method generated is stable, reproducible and allows a direct comparison between the various products.

Below you will find values of filtration efficiency of the DAR™ mechanical and electrostatic filters / HME filters resulting from the main tests carried out, with the laboratories where they were performed.

STERIVENT (351/5410, 351/5856) – MECHANICAL FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (avg.)	99.988%	Nelson Laboratories Inc. Salt Lake City, UT, USA. ^{1,43}
	Staphyloc. aureus	>99.9999%	Nelson Laboratories Inc. Salt Lake City, UT, USA. ^{1,42}
BFE	Mycobact. tuberc. H37Rv	100%	IKI - Institut für Krankenhaushygiene und Infektionskontrolle. Gießen, Germany. ^{1,13}
	Bacillus subtilis	99.99999%	HPA, Health Protection Agency. Porton Down, UK. ^{1,45}
	Pseudomonas aeruginosa	>99.99998%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH - Taunusstein-Neuhof, Germany. ¹
	Serratia marcescens	99.9999%	Vandenbroucke-Grauls C.M.J.E. et al. Dept. of Clinical Microbiology and Laboratory of Infectious Diseases, University Hospital Utrecht, NL. ^{1,11}
VFE	MS-2 bacteriophage	99.999%	HPA, Health Protection Agency Porton Down, UK. ^{1,45}
	ΦX174 bacteriophage	>99.9999%	Nelson Laboratories Inc. Salt Lake City, UT, USA. ^{1,44}
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research Porton Down, UK. ^{1,16}
Latex proteins	Allergic Natural Latex Proteins	100%	Barbara J. et al., Laboratoire de recherche en Immuno Allergologie Hôpital Tenon, Paris. ^{1,27}

STERIVENT S (351/5878) – MECHANICAL FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	99.71%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
	Staphyloc. Aureus	>99.9999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,30}
BFE	Pseudomonas aeruginosa	>99.99999%	Hygiene-Institut der Universität Graz, Austria ^{1,28}
	Micrococcus luteus	99.99998%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,31}
VFE	ΦX174 bacteriophage	>99.9999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,31}
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,17}
	HIV-1	100%	Institut Pasteur de Lille - Lille Cedex, France ^{1,20}

STERIVENT MINI (351/5979) – MECHANICAL FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	99.705%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
	Staphyloc. Aureus	>99.9999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,42}
BFE	Mycobact. tuberc. H37Rv	100%	IKI - Institut für Krankenhaushygiene und Infektionskontrolle - Gießen, Germany ^{1,22}
	Bacillus subtilis	99.99999%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,23}
VFE	MS-2 bacteriophage	99.999%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,23}
	ΦX174 bacteriophage	>99.9999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,44}
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,25}
	HIV-1	100%	Institut Pasteur del Lille - Lille Cedex, France ^{1,24}
Prions	Prion Proteins	100%	Barbieri I. et al., TSE Diagnosis and Research Laboratory - Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia ^{1,29}
Latex proteins	Allergic Natural Latex Proteins	100%	Barbara J. et al., Laboratoire de recherche en Immuno-Allergologie Hôpital Tenon, Paris ^{1,27}

HYGROSTER (354/5876) – FHME – MECHANICAL FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	99.794%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
	Staphyloc. Aureus	≥99.99998%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,32}
	Mycobact. tuberc. H37Rv	100%	IKI - Institut für Krankenhaushygiene und Infektionskontrolle - Gießen, Germany ^{1,14}
	Pseudomonas aeruginosa	>99.99997%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH - Taunusstein-Neuhof, Germany ^{1,3}
	Micrococcus luteus	>99.9999%	Hygiene-Institut der Universität Graz, Austria ^{1,4}
	Serratia marcescens	>99.999%	Holton J., Webb A.R. - Dept of Medical Microbiology, University College London Medical School, London, UK ^{1,10}
	Staphylococcus Rosaceus	>99.999999%	Borghi V. et al. - Dept of Infectious and Tropical Diseases, University of Modena, Italy ^{1,26}
BFE	MS-2 bacteriophage	>99.99%	Holton J., Webb A.R. - Dept of Medical Microbiology, University College London Medical School, London, UK ^{1,10}
	ΦX174 bacteriophage	>99.999901%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,33}
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,18}
	HIV-1	100%	Institut Pasteur de Lille - Lille Cedex, France ^{1,21}
VFE			

BARRIERBAC (350/5422, 350/5865) – ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	94.409%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. aureus	≥99.9999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,40}
	Staphylococcus Rosaceus	>99.9999%	Borghi V. et al., Dept. of Infectious and Tropical Diseases - University of Modena Italy ^{1,26}
VFE	MS-2 bacteriophage	>99.997%	Borghi V. et al., Dept. of Infectious and Tropical Diseases - University of Modena Italy ^{1,2}
	ΦX174 bacteriophage	≥99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,41}

BARRIERBAC S (350/5879) – ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	97.196%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. aureus	≥99.9999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,42}
VFE	ΦX174 bacteriophage	≥99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,44}
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,12}

BARRIERBABY (350/19003) – ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	Nacl [%] (media)	>99.999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. Aureus	≥99.999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,34}
	Pseudomonas Aeruginosa	>99.996%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH - Taunusstein-Neuhof, Germany ^{1,7}
	Micrococcus Luteus	>99.999%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
	Staphylococcus Rosaceus	>99.9998%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,26}
	MS-2 bacteriophage	>99.994%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
VFE	ΦX174 bacteriophage	≥99.99%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,35}

SPIROBAC (500P30022) – ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
BFE	BFE (test clínico)	99.9%	Borghi V. Dept. of Infectious and Diseases – Azienda Ospedaliera Policlinico of Modena ^{1,50}
	Pseudomonas diminuita	>99.9%	Borghi V. Dept. of Infectious and Tropical Diseases – University of Modena Italy ^{1,48}
	Micrococcus Luteus	>99.999%	T.Miorini "Institute of Applied Hygiene" – Graz, Austria ^{1,47}

HYGROBAC (352/5805) – ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	NaCl [%] (media)	99.771%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. aureus	≥99.9999%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,38}
	Pseudomonas Aeruginosa	>99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,46}
	Micrococcus Luteus	>99.999%	Hygiene-Institut der Universität Graz, Austria ^{1,5}
	Serratia Marcescens	>99.999%	Holton J., Webb A.R. - Dept. of Medical Microbiology, University College London Medical School, London, UK ^{1,10}
	Staphylococcus Rosaceus	>99.99999%	Borghi V. et al. Dept. of Infectious and Tropical Diseases - University of Modena, Italy ^{1,26}
	MS-2 bacteriophage	>99.999%	Borghi V. et al. Dept. of Infectious and Tropical Diseases - University of Modena, Italy ^{1,2}
VFE	ΦX174 bacteriophage	≥99.998%	Nelson Laboratories Inc. - Salt Lake City, USA ³⁹
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ^{1,19}

HYGROBAC S (352/5877) – FHME ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	NaCl [%] (media)	97.416%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ⁴³
BFE	Staphyloc. aureus	≥99.9998%	Nelson Laboratories Inc. - Salt Lake City, USA ⁴²
	Mycobact. tuberc. H37Rv	100%	IKI - Institut für Krankenhaushygiene und Infektionskontrolle - Gießen, Germany ¹⁵
	Pseudomonas Aeruginosa	>99.997%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH ⁶
VFE	ΦX174 bacteriophage	>99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ⁴⁴
	Hepatitis C Virus	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ⁵¹
	HIV-1	100%	CAMR, Centre for Applied Microbiology and Research - Porton Down, UK ⁵²

HYGROBOY (355/5430) – FHME ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	NaCl [%] (media)	96.263%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. aureus	≥99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,36}
	Pseudomonas Aeruginosa	>99.999%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH - Taunusstein-Neuhof, Germany ^{1,8}
	Micrococcus Luteus	>99.997%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
	Staphylococcus Rosaceus	>99.9997%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,26}
VFE	MS-2 bacteriophage	>99.997%	Borghi V. et al. Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
	ΦX174 bacteriophage	≥99.99%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,35}

HYGROBABY (355/5427) – FHME ELECTROSTATIC FILTRATION

Test	Challenge	Efficiency [%]	External laboratory
NaCl	NaCl [%] (media)	94.186%	Nelson Laboratories Inc. - Salt Lake City, UT, USA ^{1,43}
BFE	Staphyloc. aureus	≥99.999%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,34}
	Pseudomonas Aeruginosa	>99.996%	Institut Fresenius - Chemische und Biologische Laboratorien GmbH - Taunusstein-Neuhof, Germany ^{1,7}
	Micrococcus Luteus	>99.999%	Borghi V. et al., Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
	Staphylococcus Rosaceus	>99.9998%	Borghi V. et al., Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,26}
VFE	MS-2 bacteriophage	>99.994%	Borghi V. et al., Dept of Infectious and Tropical Diseases - University of Modena, Italy ^{1,9}
	ΦX174 bacteriophage	≥99.99%	Nelson Laboratories Inc. - Salt Lake City, USA ^{1,35}

Index and references

Code	Page	Code	Page
351/5410.....	7	R025.....	11
351/5856.....	7	R029.....	11
351/5878.....	7	350S5807.....	11
351/5979.....	7	354/5414.....	13
351/5980.....	7	354/5876.....	13
351/5987.....	7	352/5805.....	15
350S19006.....	9	352/5830.....	15
350/5422.....	9	352/5877.....	15
350/5865.....	9	352/5893.....	15
350/5879.....	9	352/5981.....	15
350/19003.....	9	352/5996.....	15
500P30021.....	11	355/5427.....	15
R001.....	11	355/5430.....	15
R002.....	11	353/19004.....	17
R004.....	11	353S19046.....	17
R005.....	11	353S19007.....	17
R006.....	11	353P5908.....	17
R007.....	11	331/5112.....	18
R010.....	11	331/5391.....	18
R011.....	11	331/5661.....	18
R012.....	11	332/5115.....	18
R013.....	11	332/5309.....	18
R015.....	11	332/5663.....	18
R016.....	11		
R022.....	11		
R023.....	11		
R024.....	11		

References

- Wilkes AR. Preventing the transmission of pathogenic microbes during anaesthesia. *Expert Rev Med Devices*. 2005;2(3):319-326.
- Wilkes Ar. The ability of breathing system filters to prevent liquid contamination of breathing systems: a laboratory study. *Anaesthesia*. 2002;57(1):33-39.
- Rathgeber J, Kietzmann D, Mergeryan H, Hub R, Züchner K, Kettler D. Prevention of patient bacterial contamination of anaesthesia-circle-systems: a clinical study of the contamination risk and performance of different heat and moisture exchangers with electret filter (HMEF). *Eur J Anaesthesiol*. 1997;14(4):368-373.
- Cann C, et al. The pressure required to force liquids through breathing systems filters. *Anaesthesia*. 2006;61:492-497.
- Lloyd G, Howells J, Liddle C, Klineberg PL. Barriers to hepatitis C transmission within breathing systems: efficacy of a pleated hydrophobic filter. *Anaesth Intensive Care*. 1997;25(3):235-238.
- Daggan R, Zefeiridis A, Steinberg D, Larijani G, Gratz I, Goldberg ME. High-quality filtration allows reuse of anesthesia breathing circuits resulting in cost savings and reduced medical waste. *J Clin Anesth*. 1999;11(7):536-539.
- Centre for Applied Microbiology and research (CAMR). Porton Down, UK. Evaluation of BSF (Type DAR Sterivent) as a barrier to hepatitis C transmission within breathing systems. August 1997.
- Institut für Krankenhaushygiene und Infektionskontrolle (IKI). Giessen, Germany. Retention capacity of the Sterivent breathing Filter against mycobacterium tuberculosis. January 1997.
- Barbara J, et al. Laboratoire de Recherche en Immuno-Allergologie. Hôpital Tenon, Paris. Evaluation of latex particles retention performance of Sterivent Filters. 2002.
- CAMR. Evaluation of BSF (Type DAR Sterivent S) as a barrier to hepatitis C transmission within breathing systems. August 1997.
- Institut Pasteur de Lille, France. Test report. Test of Sterivent S filtration efficiency against HIV1 virus (etiological agent of AIDS).
- CAMR. Microbial efficiency testing of DAR Sterivent Mini filters with hepatitis C virus. Rep. # 515/99, part 2. February 2000.
- Institut Pasteur de Lille, France. Test report. Test of Sterivent Mini filtration efficiency against HIV1 virus (etiological agent of AIDS). IPL Report # NC/0991298. January 1999.
- IKI. Retention capacity of the Sterivent Mini breathing filter against mycobacterium tuberculosis. August 1998.
- Barbieri I, et al. Filtration efficiency test of the filter Tyco Sterivent Mini against the prionic pathological protein PrPSE. 2005.
- Lellouche F, et al. Humidification performance of 48 passive airway humidifiers: Comparison with manufacturer data. *Chest*/135/2. February 2009.
- Nelson Laboratories Inc. Sodium chloride aerosol testing of breathing system filters (BSF). Lab # 399951A.1 (Amended). January 2008.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab #399950. January 2008.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab. # 406241. January 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab. # 399952. January 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab. # 406252. January 2008.
- MHRA. Evaluation # 04005. Breathing system filters, an assessment of 104 breathing system filters. March 2004.
- CAMR. Evaluation of BSF (Type DAR Barrierbac S) as a barrier to hepatitis C transmission within breathing systems. August 1997.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab # 416378B. March 2008.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab. # 416577. March 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab # 416379. March 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab # 416575. March 2008.
- Borghi V, et al. Bacterial contamination of instruments for lung function tests: microbial removal efficiency of a Filter. July 1995.
- Miller MR, et al. Series ATS/ERS task force: Standardization of lung function testing. Standardization of spirometry. *Eur Respir J*. 2005;26:319-338.
- Borghi V. Evaluation of bacterial removal efficiency in membranes used on Spirobac Filter. November 2000.
- Borghi V. Tests on the virus retention capacity of the Spirobac Filter. November 1994.
- Rathgeber J, et al. Air conditioning using a high-performance heat and moisture exchanger (HME): an effective and economical alternative to active humidifiers in mechanically ventilated patients. A prospective, randomized clinical study. *Anaesthesist*. 1996;45:518-525.
- Dodek P, Keenan S, Cook D, et al. Evidence-based clinical practice guideline for the prevention of ventilator-associated pneumonia. *Ann Intern Med*. 2004;141(4):305-313.
- Ricard JD, Boyer A, Dreyfuss D. The effect of humidification on the incidence of ventilator-associated pneumonia. *Respir Care Clin N Am*. 2006;12(2):263-273.
- Siempos II, Vardakas KZ, Kopterides P, Falagas ME. Impact of passive humidification on clinical outcomes of mechanically ventilated patients: a meta-analysis of randomized controlled trials. *Crit Care Med*. 2007;35(12):2843-2851.
- CAMR. Evaluation of BSF (Type DAR Hygroster) as a barrier to hepatitis C transmission within breathing systems. August 1997.
- Institut Pasteur de Lille, France. Test report. Test of Hygroster filtration efficiency against HIV1 virus (etiological agent of AIDS). March 1998.
- IKI. Retention capacity of the Hygroster breathing filter against mycobacterium tuberculosis. January 1997.
- Health Protection Agency (HPA, formerly CAMR). Porton Down, UK. An evaluation of filtration efficiencies of the Hygroster Mini against mycobacterium tuberculosis aerosol challenges. Report #957-05B. August 2005.
- Nelson Laboratories Inc. Salt test method to assess filtration performance of breathing system Filters (BSF). Protocol #200516803-01. Laboratory # 294689. July 2005.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab #406251. January 2008.
- HPA. An evaluation of filtration efficiencies of the Hygroster Mini against bacterial and viral aerosol challenges. Report #957-05. June 2005.
- Nelson Laboratories Inc. Virus Filtration Efficiency Test (VFE) at an Increased Challenge Level. Lab #406250. January 2008.
- Medical Device Evaluation Unit. Cardiff University, UK. Test report on Hygroster Mini. Report #050102. July 2005.
- Technologie-Institut Medizin, GmbH (TIM). Universitätsklinikum Göttingen, Germany. HME test. Report #2009/05 DAR Hygroster Mini. May 2009.
- CAMR. Evaluation of BSF (Type DAR Hygrobac) as a barrier to hepatitis C transmission within breathing systems. August 1997.
- CAMR. Microbial efficiency testing of DAR Hygrobac S filters with hepatitis C virus. Rep. #569/99. August 1999.
- CAMR. Microbial efficiency testing of DAR Hygrobac S filters with HIV. Report #608A/99. Reissued June 22, 2000.
- IKI. Retention capacity of the HYGROBAC S breathing filter against mycobacterium tuberculosis. January 1997.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab. #416380. March 2008.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab #416552. March 2008.
- Nelson Laboratories Inc. Bacterial filtration efficiency test (BFE) at an increased challenge level. Lab #416577. March 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab #416381.C (Amended). April 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab #416578. March 2008.
- Nelson Laboratories Inc. Virus filtration efficiency test (VFE) at an increased challenge level. Lab #416575. March 2008.
- Technologie-Institut Medizin, GmbH (TIM). Universitätsklinikum Göttingen, Germany. HME test report #2008/22 DAR Hygrobac S. July 2008.
- Technologie-Institut Medizin, GmbH (TIM). Universitätsklinikum Göttingen, Germany. HME test report #2009/04 DAR Hygroster. May 2009.
- Nelson Laboratories Inc. Sodium chloride aerosol testing of breathing system filters (BSF). Lab #717597. November 2013.

IMPORTANT: Please refer to the package insert for complete instructions, contraindications, warnings and precautions.

medtronic.co.uk/acm

©2024 Medtronic. Medtronic, Medtronic logo and Engineering the extraordinary are trademarks of Medtronic. All other brands are trademarks of a Medtronic company. TM*Third-party brands are trademarks of their respective owners.
emea-re-2400062-dar-filters-catalogue-en-gb-emea-13915630

Medtronic